T-Level Handbook Development

TOPIC 7

Below is **Topic 7- Construction Mathematical Techniques**, please read through the curriculum learning outcomes and design an interactive task T-Level Students can do on-site:

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| **7.1 Students must be able to select and apply mathematical techniques correctly to solve construction problems** |
| 7.1.1 | Areas, volumes and perimeters of 2D and 3D shapes: ● Regular shapes – rectangles, trapeziums, triangles, circles and regular polygons ● Irregular shapes – with straight and curved edges ● Compound shapes – combinations of whole and partial simple shapes. ● Diameter, circumference and radius of a circle  | **Task developed:****Refer to:****Support document for topic 7 – Ramps task for 7.1.** **Read the document and answer the questions posed.** |
| 7.1.2 | Pythagoras’ theorem.  |
| 7.1.3 | Trigonometric techniques: sine, cosine, tangent ratios, sine rule and cosine rule.  |
| 7.1.4 | Triangle area rules  |
| 7.1.5 | Algebraic transformation |
| Notes: |
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| **7.2 Students must be able to select and apply basic differentiation and integration techniques correctly and understand how calculus is used to solve practical construction problems** |
| 7.2.1 | Differential calculus: basic differentiation (one step) for polynomial and trigonometric functions  | **Task developed:** |
| 7.2.2 | Integral calculus: ● indefinite and definite integration techniques (one step) for polynomial and trigonometric functions ● constant of integration and initial conditions.  |
| 7.2.3 | Numerical integration: Simpson’s Rule, Mid-Ordinate Rule, Trapezoidal Rule |
| Notes:Most of these are classroom based  |

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| **7.3 Students must be able to use statistical methods to analyse grouped, ungrouped, continuous and discrete sets of data, and understand how these are used to solve practical construction problems** |
| 7.3.1 | Averages and central tendency: mean, median and mode. | **Task developed:**Open the ‘Preliminaries’ document and refer to the Programme tab and the Preliminaries tab;1. On the Prelims tab, use the number of day in column B to change into a % of the work week e.g. 5 days would be 100%, 1 day would be 20%. Some roles in Construction will work on 1 project full time, whereas other roles will be over several projects and therefore there costs are split accordingly.
2. Use the programme tab to fill in columns D & columns E, to calculate the number of week that each person is on site from and to.
3. What is the total cost of preliminaries using the information on the attached?
4. The total cost of the Project is £1 Million Pounds. What percentage of the £1,000,000 is staff? Work this out in cell H63?
5. What are the number of staff on the project? Write this in cell H64.
6. What is the cost of 1 weeks preliminaries on site? Work this out in cell H65
7. What would the overall cost be if the programme length increased to 25 weeks instead of 20? Use your answer from item f above.
8. What would be the additional cost if the planner works for 2 days a week instead of 1?
9. What would be the additional cost if the Site Surveyor works for 5 days a week?
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| 7.3.2 | Dispersion: range, standard deviation |
| Notes:Jo to arrange a task for Averages, mean, median and ModeContact Comparison- Pre -limb book a mock version Jo will put a page together of this as a task calculate averages. |

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| **Resources for Tasks** – Please can you attach or upload any resources Students will need to complete Tasks, think of any resources you might already have in-house in shared drive /online training resources/ PowerPoint resources. |
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**Consider using these resources to support task creation:**